

REMARKS/ARGUMENTS

Claims 64, 66 and 71 stand in the present application. Reconsideration and favorable action is respectfully requested in view of the following remarks.

In the Office Action, the Examiner has rejected claims 64, 66 and 71 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 of U.S. Patent No. 5,652,434 in view of Edmond et al. and Mannou et al. and has rejected the same claims under 35 U.S.C. § 103(a) as being unpatentable over Edmond et al. in view of Mannou et al. Applicants respectfully traverse the Examiner's rejections of the claims based on § 103 and obviousness-type double patenting.

Key structural features of Applicants' inventions are recited in independent claims 64 and 71 which key features include provision of an n-layer and a first p-type clad layer. The n-layer comprises an n-type GaN or n-type nitride semiconductor containing indium and gallium (InGa_N). The first p-type clad layer comprises a p-type InGa_N. An active layer of a multi-quantum well structure having a InGa_N well layer is provided between the n-type layer and the first p-type clad layer. Further a second p-type clad layer is formed over the first p-type clad layer. The second p-type clad layer is made of a p-type AlGa_N, which differs from the InGa_N that constitutes the first p-type clad layer.

The structural feature of providing the active layer on the n-type GaN or InGa_N, results in the crystallinity of the active layer being improved because the n-type GaN or InGa_N is a soft material. The multi-quantum well structure containing InGa_N well layers further improves the crystallinity of the active layer because the InGa_N well layers

contained in the multi-quantum well structure are soft, and the multi-quantum well structure includes thin well layers and thin barrier layers. (See present application at page 18, line 27 through page 19, line 25.) By forming multiple thin layers into an active layer, adverse effects exerted by the lattice mismatching on the crystallinity may be suppressed. By providing the second p-clad layer of AlGa_N on the first p-clad layer of InGa_N which is soft, the crystallinity of the second p-clad layer is improved. Since the crystallinity of the second p-clad layer is improved, the second p-clad layer contributes to effective light-emitting.

Finally, by providing the Ga_N contact layer on the second p-type clad layer of AlGa_N having the improved crystallinity, light is emitted effectively from the device.

The above described structure and effects of Applicants' inventions as recited in independent claims 64 and 71 are not taught or suggested by the cited references taken singly or in any combination. Present claim 71 has the second n-type clad layer of AlGa_N, in addition to the structures recited in claim 64. Therefore, the same effects as described above can be obtained. Additionally, the second n-type clad layer of AlGa_N effectively functions as a clad layer, since it contains Al and Ga.

Applicants respectfully submit that absent the hindsight teaching of the present application, it would not have been obvious to combine the references in the manner suggested by the Examiner and that, in any event, even when the references are combined Applicants' inventions do not result. More particularly, the '434 patent fails to disclose an active layer as admitted by the Examiner but also fails to teach or suggest the other key elements of Applicants' inventions. For example, the '434 patent does not teach or suggest a clad layer which serves to confine carriers or light as clearly recited

in present claims 64 and 71. In addition, as acknowledged by the Examiner, the '434 patent also does not teach or suggest a second p-type cladding layer. It should be noted, however, that the Examiner's reliance on Mannou et al. for solving this deficiency of the '434 patent is misplaced in that the second p-type cladding layer in Mannou et al. is not provided over the first p-type clad layer as required in present claims 64 and 71. Indeed, Mannou et al. in Figure 4(c) and as explained in its specification at column 3, lines 34-60 uses its second cladding layer to substantially cover a current blocking layer 45 and only incidentally covers a small portion of first cladding layer 44.

Moreover, as noted in the previous amendment dated January 16, 2004 and incorporated herein by reference, the '434 patent discloses and claims a so called horizontal device which does not teach or suggest a clad layer which serves to confine carriers or light, as required in present claims 64, 66 and 71.

Thus, it is respectfully submitted that those ordinarily skilled in the art would not have been led to combine the references in the manner suggested by the Examiner but that even if the references are combined, Applicants' invention with the above-described structures as clearly recited in independent claim 64 and 71 would not have resulted.

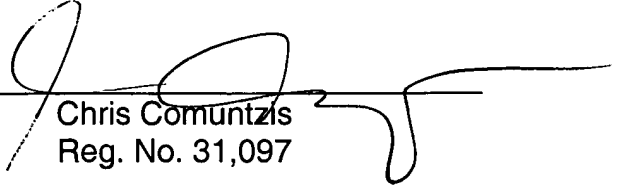
Therefore, in view of the above remarks, it is respectfully requested that the application be reconsidered and that all of claims 64, 66 and 71, standing in the application, be allowed and that the case be passed to issue. If there are any other issues remaining which the Examiner believes could be resolved through either a supplemental response or an Examiner's amendment, the Examiner is respectfully requested to contact the undersigned at the local telephone exchange indicated below.

NAKAMURA et al.
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Respectfully submitted,

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